

Serial No. 09/909,992
Amdt. dated October 3, 2003
Reply to Office Action of June 3, 2003

Docket No. FSU-0004

REMARKS/ARGUMENTS

Claims 1-21 are pending. Claims 14-21 have been withdrawn from consideration by the Examiner. By this Amendment, claims 1 and 10 are amended. Support for the claims can be found throughout the specification, including the original claims, and the drawings. Reconsideration in view of the above amendments and following remarks is respectfully requested.

Applicant maintains her traversal of the restriction requirement. Further, the Examiner states on page 2 of the Office Action, regarding claim 14, that:

The claim is properly restricted because claims 1-13 are drawn to a method and claim 14 is drawn to an apparatus for its practice. The apparatus as claimed can be used to practice another and materially different process, specifically a heater. A different and additional search will be required to find the structural element corresponding to the "means for absorbing sufficient energy in the one or more particles, the surface, the sample and/or the energy transfer medium to dislodge the one or more particle(s).

However, the Examiner is directed to MPEP §809 which states in pertinent part that "linking claims must be examined with the invention elected, and should any linking claim be allowed, the restriction requirement must be withdrawn." The Examiner is further directed to MPEP §809.03 which identifies the most common types of linking claims, including a claim to "means" for practicing a process linking proper apparatus and process claims." Accordingly, at least claim 14 should be rejoined and examined along with claims 1-13.

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The Office Action objects to the title, and suggests a new title. However, because thermophoresis is used to prevent redeposition of particle(s) once removed and not to remove particle(s), the Examiner's proposed title is not properly descriptive. Applicant asserts that the original title of "Method and Apparatus for Removal of Minute Particles from a Surface using Thermophoresis to Prevent Particle Redeposition" is properly descriptive, and thus the objection should be withdrawn.

The Office Action rejected claims 1-3, 6-9, and 10-11 under 35 U.S.C. §102(b) as being anticipated by the reference J. Appl. Phys. Vol. 71, No. 7, April 1992, to Tam et al. (hereinafter "the Tam reference"). The rejection is respectfully traversed.

The Examiner asserts that the Tam reference discloses all of the claimed features, arguing that the Tam reference discloses the step of creating a temperature gradient adjacent to the surface to prevent the one or more particles from redepositing on the surface because "[i]nherently the duration of the laser pulse will result in a thermal gradient, and the thermal gradient will inherently behave the same way because the claimed and disclosed method steps are the same."

However, independent claims 1 and 10 have been amended to recite "creating a temperature gradient adjacent to the surface *sufficient* to prevent the one or more particle(s) from redepositing on the surface." The Tam reference does not disclose or suggest creating a temperature gradient adjacent the surface "sufficient" to prevent one or more particle(s) from

redepositing on the surface. Rather, the Tam reference discloses the range of laser heated temperature gradients on page 3518. That is, the Tam reference states that "[t]he pulse length we have used so far (typically about 16 ns) corresponds to a thermal diffusion length of about 1 μm in Si and about 0.1 μm in water." The temperature gradients generated using the methodology taught by the Tam reference are huge ($\Delta T \approx 350 \text{ K}$ and $\Delta z \approx 10^{-6} \text{ m}$ yields a $\Delta T / \Delta z \approx 3.5 \times 10^8 \text{ }^\circ\text{C/m}$), but very short range (microns) and only exist for a short period of time (tens of ns). The diffusion length of the removed particles in air is much larger than the extent of the laser produced temperature gradient and the particles and water vapor/droplets persist more than 200 μs , as shown in Fig. 8 of the Tam reference. In contrast, the intent of the present invention is to combine with the particle removal process an externally applied temperature gradient sufficient to prevent particle redeposition. Such a temperature gradient could extend for distances on the order of mm to tens of cm.

Accordingly, as the Tam reference fails to disclose or suggest a method of removing one or more particle(s) adhered to a surface of a sample comprising arranging an energy transfer medium under and around the one or more particle(s), irradiating the one or more particle(s), the surface and/or the energy transfer medium with laser energy, and absorbing sufficient energy in the one or more particle(s), the surface, the substrate, and/or the energy transfer medium to dislodge the one or more particle(s), in combination with creating a temperature gradient adjacent to the surface sufficient to prevent the one or more particle(s) from redepositing on the

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surface, as recited in independent claim 1, or a method of removing one or more particle(s) adhered to a surface of a sample comprising irradiating the one or more particle(s)/sample combination with laser energy, and absorbing sufficient energy in the one or more particle(s)/sample combination to dislodge the one or more particle(s), in combination with creating a temperature gradient adjacent to the surface sufficient to prevent the one or more particle(s) from redepositing on the surface, the rejection should be withdrawn. Dependent claims 2-3, 6-9 and 11 are allowable at least for the reasons discussed above with respect to independent claims 1 and 10, from which they respectively depend, as well as for their added features.

The Office Action rejects claims 4-5 and 12-13 under 35 U.S.C. §103(a) as being unpatentable over the Tam reference in view of Allen, U.S. Patent No. 4,987,286. The rejection is respectfully traversed.

The Allen reference fails to overcome the deficiencies of the Tam reference discussed above with respect to independent claims 1 and 10. Accordingly, claims 4-5 and 12-13 are allowable at least for the reasons discussed above with respect to independent claims 1 and 10, from which they respectively depend, as well as for their added features, and thus the rejection should be withdrawn.

Regarding the Information Disclosure Statement filed June 26, 2002, Applicant is still attempting to obtain copies of references W, X, Y, DD, and OO. It is noted that references X

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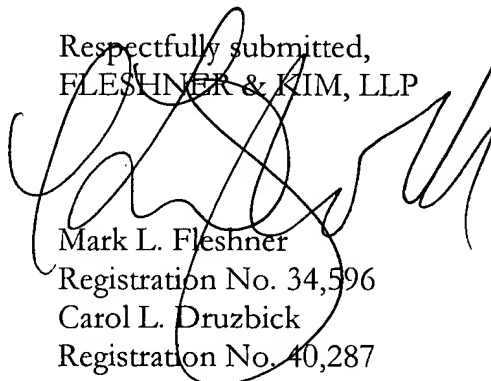
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and OO are out of print. It is further noted that references O, R, and LL are the same reference. If the Examiner fails to receive the above-mentioned references before issuing the next Office Action, he is requested to forward an initialed copy of the Form PTO-1449 with the missing references marked out along with the Office Action.

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney, Carol L. Druzbeck, at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
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